**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Date \_\_\_\_\_\_\_\_\_\_**

**Rate of Dissolving Materials Lab**

**Materials:**

• goggles • 50-mL graduated cylinder • gram scale

• water • 250-mL beaker • hot plate

• sugar (cubes / crushed) • thermometer • stirring rod/spoon

• heat resistant gloves • 2 clear cups or 100 mL beakers • stop watch

**Background:** For the past week we have been investigating solutions in the classroom. We have identified the parts of a solution (solvent, solute) and we have talked about the factors that affect the rate in which a solute is dissolved by a solvent. The three factors we identified where *temperature, surface area* and *agitation*. Today you will be testing each of these factors to see how you can measure their impact on the rate of dissolving.

**Procedure PART A**

1. Safety goggles should be worn throughout this experiment.
2. ***READ THE LAB COMPLETELY THROUGH BEFORE BEGINNING***. Gather laboratory materials.
3. Continue reading your lab as the water warms
   1. HOT WATER SAMPLE: Measure 50 mL of water and place in a 100 mL glass beaker. Make sure there are no cracks or chips in the glass before you place the beaker on the hot plate and turn it to 8. Bring water to a boil.
   2. COLD WATER SAMPLE: Measure 50 mL of water and place in a 100 mL glass or plastic beaker of water. This will be your cold water sample.
4. On one coffee filter, carefully measure 3 grams of sugar. Label this sample A. On another coffee filter, carefully measure 3 grams of sugar. Label this sample B.
5. Once the water reaches the boiling point, use heat resistant gloves to carefully remove the beaker and set on the table. **Do not add the sugar when the water is on the hot plate.**
6. Place sugar sample A in the hot water and time how long it takes for the sugar to *completely dissolve* using a stop watch. Do not shake or stir the solution. Record your observations in your data table in your journal.
7. Place sugar sample B in the cold water and time how long it takes for the sugar to *completely dissolve* using a stop watch. Do not shake or stir the solution. Record your observations in your data table in your journal.
8. Rinse out all cups and prepare for the next test.

**Procedure PART B**

1. You will design and conduct a series of labs to test 1 variable at a time that affects the rate of dissolving.
2. Conduct the investigations needed to complete the data tables.
3. Once you are completely finished, ***WASH*** each beaker out and place it on the rack to dry. Make sure your hot plate is unplugged, and return goggles. **Wash off your work area** so it is clean of sugar and water.

**DATA / OBSERVATIONS**

**TEST 1 – Temperature**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cup** | **Sugar** | **Water Temperature** | **agitated** | **Time** |
| **A** | **3 g crushed** | **Hot:** | **No** |  |
| **B** | **3 g crushed** | **Cold:** | **No** |  |

**Observations:**

**TEST 2 – Variable tested \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cup** | **Sugar** | **Water Temperature** | **agitated** | **Time** |
| **C** |  |  |  |  |
| **D** |  |  |  |  |

**Observations:**

**Test 3 – Variable tested \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cup** | **Sugar** | **Water Temperature** | **agitated** | **Time** |
| **E** |  |  |  |  |
| **F** |  |  |  |  |

**Observations:**

**Test 4 Variable tested \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Cup** | **Sugar** | **Water Temperature** | **agitated** | **Time** |
| **G** |  |  |  |  |
| **H** |  |  |  |  |

**Observations:**

**ANALYSIS/CONCLUSIONS:** (Record your answers.)

1. In this lab, the solvent was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the solute was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Complete the data table below identifying the student controlled and dependent variables in each test. Test 1 has been completed for you.

|  |  |  |
| --- | --- | --- |
|  | **Student Controlled variables** | **Dependent variables** |
| **Test 1** | Sugar mass, Temperature, amount of water, no agitation | Time |
| **Test 2** |  |  |
| **Test 3** |  |  |
| **Test 4** |  |  |

4. How does the particle size affect the rate at which sugar dissolves in water?

5. How does temperature affect the rate at which sugar dissolves in water?

6. How does stirring affect the rate at which sugar dissolves in water?

7. If you wanted to dissolve a substance faster, what should you do?

8. If you wanted to dissolve a larger amount of substance, say 10 sugar cubes, what should you do to dissolve the sugar faster?

9. Based on lab observations, what affect might surface area and particle size have on starting a fire with wood?

Define each term AND give an example of how/when you saw it in your lab:

|  |  |  |
| --- | --- | --- |
| TERM | Definition | In action in the lab |
| Solvent |  |  |
| Solute |  |  |
| Soluble |  |  |
| Agitation |  |  |
| Temperature |  |  |
| Surface Area |  |  |
| Dissolve |  |  |